DOCUMENT RESUME

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ABSTRACT

This self-paced student training module on safety when using hand tools is one of a number of modules developed for Pre-apprenticeship Phase 1 Training. Purpose of the module is to teach students the correct safety techniques for operating common hand- and arm-powered tools, including selection, maintenance, technique, and uses. The module may contain some or all of the following: a cover sheet listing module title, goal, and performance indicator; study guide/checklist with directions for module completion; introduction; information sheets providing information and graphics covering the module topic(s); self-assessment; self-assessment answers; post assessment; and post-assessment answers. (YLB)

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ED217273

INDIVIDUALIZED LEARNING SYSTEMS

PRE-APPRENTICESHIP PHASE 1 TRAINING

OCCUPATIONAL SAFETY
HAND TOOLS

CE032905

Goal:

The student will know the correct safety techniques for operating common hand- and arm-powered tools, including selection, maintenance, technique and uses.

Performance Indicators:

The student's performance in mastering the information in this module will be measured by assessment exams or by successful completion of two required assignments.

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Study Guide

This study guide is to be used by the student as a "blueprint" to sucessfully complete this module. Please complete all of the following steps, and check them off as you complete them.

1. ____ Familiarize yourself with the Goal and Performance Indicators of this module. This will give you an overall view of what the module contains and what you'll have to do to complete it.

2. ____ Study the Information section thoroughly. This will provide you with the knowlege necessary to pass the exam.

3. ____ As stated in the Performance Indicators on the cover sheet of this module, you may be examined in one of two ways: 1) by taking the Self Assessment and Post Assessment exams or 2) by completing the Assignment as explained on the Assignment sheet.

   a. ____ Complete the Assignment; your instructor will evaluate your performance.

   or

   b. ____ Take the Self Assessment exam which follows the Assignment page. The exam is designed to determine whether you have learned enough from the Information section to successfully complete the Post Assessment exam. You may refer to the Information section for assistance, but if you have too much trouble with the Self Assessment, you should re-study the Information section before going on to the next step. Compare your Self Assessment answers with those on the Self Assessment answer sheet which follows the exam.

   c. ____ Complete the Post Assessment exam and turn it in to your instructor for grading. It is recommended that you score 90% or better on the Post Assessment exam before going to the next module.

Information

This module, "Occupational Safety - Hand Tool Safety," covers the safety procedures for properly handling and maintaining the most common hand-powered tools formed in the most common work sites. Since the use of tools enables workers to carry out the most important functions of their jobs, each worker must know how to use his or her tools as safely and as efficiently as possible. Obviously, all tools should be kept clean and free of grease or other substances which might affect the grip of the worker or might impair the tools' efficiency. Likewise, tools should not be thrown. In addition to possible worker injury, the tool might be damaged, as well.

This and the following pages contain specific rules for good safety practice. The tools have been grouped into categories for easy reference.

A. HAMMER SAFETY: claw, ball peen, blacksmith's, bricklayer's, setting, riveting, engineer's, stone sledge, mash, and upholsterer's.
   1. Choose the correct type and size hammer for the job.
   2. The hammer face should be about 3/8" larger in diameter than the object being struck.
   3. Never strike two hammer faces together; the faces may chip off.
   4. Strike the object squarely and flatly to prevent slipping or denting.
   5. If the tool's handle is damaged replace the handle.
   6. If the hammer face is damaged or worn out replace the entire hammer.
   7. Use a sledge to drive hardened cut and masonry nails, not a claw or bricklayer's hammer. This can damage the faces of the latter two and may cause dangerous flying pieces.
   8. Do not use hammers on wooden or plastic handled chisels. Hammers will ruin these handles and may injure hands.
   9. Do not pound with the cheek (side) of the hammer. It can too easily slip off and also will damage the handle.

B. MALLET SAFETY: wood, plastic, rubber, rawhide, and nonferrous hammers such as lead, copper, aluminum, and brass.

1. Never use mallets for pounding on sharp objects or for driving nails. This will damage the soft heads.
2. Use mallets to pound on wood or plastic handled chisels to prevent damaging the chisels.
3. Do not use a mallet if the handle is loose, the head may fly off.

C. STRUCK TOOL SAFETY: cold chisels, all-steel wood chisels, drift punches and pins, star drills, blacksmith's punches, nail sets, wedges, brick sets and nail pullers.

1. Be sure struck tools are ground at the proper angles, are sharp and have no burns.
2. Remove mushroomed heads and properly dress the struck face to prevent flying pieces.
3. Replace worn out, cracked, or bent struck tools to prevent injuries.
4. Choose the correct struck tool for the job.
5. Hold the struck tools steady, but with a relaxed grip, so fingers or hands will not be hit. Use pliers or another tool if there is a hand injury hazard.
6. Tools being struck by other workers should be held with tongs.
7. Protect sharp edges when tools are stored, to prevent damaging them or cutting your hands or fingers.
8. Use a sledge, not a bricklayer's hammer, when hitting a brick set to prevent chipping the bricklayer's hammer face.

D. SCREWDRIVER SAFETY: regular, Phillips, Reed and Prince, and electrician's or cabinet in all their shapes and sizes.

1. Select the correct screwdriver for the job with the correct tip style and size, the correct length and shank, the correct handle size, smaller diameter for more speed, larger for more torque.
2. Never pound on a screwdriver. This will ruin the handle, damage the tip, and bend or break the shank.
3. Do not hold the screw with your hand while driving it, drill or punch a pilot hole to prevent hand or finger injuries.
4. Keep hands and fingers out from under the screwdriver to prevent gashes if it slips.
5. Screwdrivers should not be used as pry bars; this will bend or break the

shank and damage the tip.

6. Never use pliers to help turn a screwdriver, the job teeth will ruin the shank or handle.
7. Use an appropriate wrench only on heavy-duty, square-shanked screwdrivers.
8. Use a screw-holding clip or magnetized screwdriver to start screws in awkward places and to avoid hand or finger injury.
9. Use non-sparking screwdrivers, usually made of beryllium copper, when working near explosive vapors.
10. Use only properly insulated screwdrivers when working on electrical devices.
11. Do not use a screwdriver for electrical testing, this will burn or blast a piece out of it.
12. Do not use a screwdriver for stirring paint, varnish, or other materials that will leave a coating on it.

E. WRENCH SAFETY: open-end, box, socket, adjustable, pipe, monkey, chain, spanner, tee, torque, and Allen.

1. Select the right type of wrench for the job. Box and socket are usually the safest.
2. Select the correct size wrench for the job, considering fit and leverage needed. A snug fit is necessary. Don't use cheater bars as the force of the additional leverage will exceed what the wrench handle was designed to withstand.
3. Pull on adjustable wrenches, putting the force on the fixed jaw.
4. Be sure the wrench fits squarely on the object and is not tilted. This will help prevent slipping off or damage to the wrench and object.
5. Be sure your footing and your stance is adequate to prevent falling if something should let loose unexpectedly. Brace yourself if necessary.
6. Use a straight handle rather than an offset if possible, as there is less chance of slipping.
7. Never pound with a wrench.
8. Use penetrating oil on a frozen object first. If this does not loosen it, use a heavy-duty wrench that has a striking face (made to hit with a hammer).

F. PLIERS SAFETY: regular, slip-joint, pump, long nose, needle nose, side cutters, lineman's, crimpers, hose clamp, wire stripper and glass cutters.

1. Select the correct size and type for the job.
2. Never use a cheater on pliers as it can bend, break, and ruin them.
3. Do not expose pliers to excessive heat as it will draw the temper out.

4. When cutting, cut at right angles to the wire. This puts the least strain on the pliers.
5. Do not bend the wire back and forth against the cutting edges as it may damage the edges or spring the pliers.
6. When cutting, point the open side down so the cut end will not fly out at someone.
7. Put a drop of oil on the pliers joint to lengthen its life and allow for easier operation.
8. Use only pliers with high dielectric insulation (not just plastic-dipped ones) when working on electrical devices to prevent shocks or electrocution.
9. Keep jaw teeth or knurls clean to avoid slips and damage to material surface.
10. Never use pliers as a hammer.

G. VISE SAFETY: utility, machinist's, woodworker's, pipe and drill press.
1. When working on an object held in a vise, work as close to the vise as possible. This will help eliminate vibrations and chances for slipping.
2. Clamp objects in the middle of the jaw to prevent uneven strains on the vise.
3. Never use a cheater on a vise handle. This will bend the handle or ruin the screw.
4. Use a vise of adequate size. It is easy to ruin a vise by overloading it.
5. Be sure the vise is securely fastened to prevent it from falling off. Use all bolt holes and proper sized bolts.
6. Do not pound on vise jaws. They are hardened and may chip or crack.
7. Support the far end of long work to avoid putting excessive strain on the vise.
8. Repair or replace a damaged vise before using it.

H. CLAMPING TOOL SAFETY: bar, pipe, miter, spring, hand screw, "C", welder's, bank, and vise grips.
1. Select the correct size and type of clamp.
2. Keep all moving parts clean and lightly oiled to provide easy operation.
3. Do not over-tighten clamps and never use a cheater. This will bend, break, or ruin the threads.
4. Do not use clamps to secure scaffolding. If they are bumped they could let loose.
5. Never use clamps for hoisting materials. Use only approved devices.

I. SNIPS SAFETY: tin, aviation, combination, compound, lever, and shears.

1. Select the correct size and type snips for the job.
2. Keep snips sharp.
3. Do not cut wire with snips, it will damage the cutting edges. Use only on non-hardened sheet metal.
4. Use only hand pressure on the handles, never a hammer or your foot. This could spring the hinge.
5. Protect the edges and points of snips when stored to prevent injury and damage.
6. Wear gloves when cutting with snips.

J. SAW SAFETY: hand saws, miter box, keyhole, compass, hack, back, dovetail, and coping.

1. Select the correct type and size saw for the job.
2. Keep saws sharp and set to insure good cutting.
3. Protect the points from being damaged by checking for nails, bolts or grit before sawing.
4. Use a saw-horse or bench, not your knee or leg to hold material when sawing.
5. Make sure saw handle is in good condition and tight.
6. Be aware of hand, finger, and leg position when sawing to prevent personal injury.
7. Wear gloves when sawing metal to prevent being cut by sharp cuttings.
8. Hacksaw teeth should point away from the handle and saw strokes directed away from yourself.

K. FILE AND RASP SAFETY: rough, coarse, bastard, second-cut, smooth and dead smooth metal files, cabinet files, wood rasps, other surform tools.

1. Select the proper type and size file for the job.
2. Do not confuse wood and metal files and rasps. Filing metal with a wood file or rasp will ruin it.
3. Cut on the forward stroke.
4. Clean files often while using to prevent slipping and to insure good cutting.
5. All files must have handles of proper size to prevent hand wounds.
6. Clamp objects to be filed securely to prevent filing your hand or fingers.
7. Never use files or rasps as pry bars, they are very hard and brittle and will snap, besides damaging the teeth.

Assignment

Select any two of the following three assignments to complete instead of taking the Self Assessment and Post Assessment exams.

1. Carry your tool box, kit or pouch to your instructor and demonstrate and tell him or her the proper use, the proper maintenance and the proper selection (what the tool is used for, as well as what it is not used for) for every tool you have. Explain the characteristics of each and point out any potential safety hazards which may exist on each tool.

2. Have your instructor improperly select and/or demonstrate the use of at least one tool from at least seven of the tool categories described in the Information section, while you point out what's wrong with the selection and/or use of each.

3. In your instructor's presence, compare your tools (or your employer's tools if you have access to them) with new tools of similar make, and describe any flaws, damage or improper maintenance which might make your tools unsafe.

Self Assessment

Select the answer which best completes the statement. Write the answer in the blank to the left of each statement.

1. ____ Hand tools should always:
   a. have a layer of grease to prevent rust during winter work
   b. have a layer of oil to prevent rust during winter work
   c. be kept clean of grease or oil at all times
   d. be covered with graphite during the winter

2. ____ The hammer face should be how much larger in diameter than the object being struck?
   a. 3/8"
   b. 5/8"
   c. 1" or more
   d. 1/16" only

3. ____ If a mallet handle is broken, you should always:
   a. tape the handle with non-ferrous tape
   b. glue and splice the handle
   c. heat the handle
   d. replace the handle

4. ____ The following is an example of a struck tool:
   a. star drill
   b. cresent wrench
   c. screwdriver
   d. needle nose pliers

5. ____ Tools being struck by others should be held with:
   a. gloves
   b. tongs
   c. cheater bars
   d. hoists

6. ____ On which type of screwdriver should a wrench be used?
   a. heavy-duty, square-shank
   b. star shanked titanium
   c. Phillips light weight
   d. none of the above

7. ____ Proper wrench safety always includes:
   a. oiling the handle
   b. tilting the wrench at an angle
   c. using an offset handle whenever possible
   d. using penetrating oil on frozen objects

8. ____ What type of cheater should be used with pliers?
   a. non-ferrous metal
   b. wood
   c. none
   d. spring steel

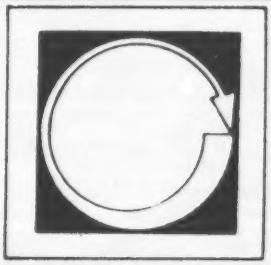
9. ____ When using a vise, objects should be clamped:
   a. at the near end of the jaw
   b. at the middle of the jaw
   c. wherever you want
   d. at the far end of the jaw

10. ____ Clamps should be:
   a. stored in a pile
   b. used for hoisting
   c. used for securing scaffolding
   d. tightened without the use of a cheater

Self Assessment Answers

1. c
2. a
3. d
4. a
5. b
6. a
7. d
8. c
9. b
10. d

Post Assessment



Select the answer which best completes the statement. Write your answer in the blank at the left of the statement.

1. ____ Snips may be used to cut:
   a. wire
   b. non-hardened sheet metal
   c. all lead alloys
   d. hardened sheet metal

2. ____ Hacksaw teeth should be:
   a. pointed toward your body
   b. pointed away from your body
   c. bent at both ends
   d. heated before cutting

3. ____ One characteristic of a file or rasp is it's:
   a. brittle
   b. soft
   c. springy
   d. silver coated

4. ____ When working on or near electrical devices, use only pliers with:
   a. high dielectric insulation
   b. low dielectric insulation
   c. circuit breakers
   d. plastic handles, shanks, tips and barrels

5. ____ A cheater bar provides for:
   a. more leverage
   b. less leverage
   c. less foot-pounds-per-square-inch
   d. C-clamps

6. ____ Wrenches should always be:
   a. pulled toward your body
   b. pushed away from your body
   c. owned by the contractor
   d. silver-plated

7. ____ Struck tools with mushroomed heads should be:
   a. repaired
   b. used as often as possible
   c. used in conjunction with a sledge hammer
   d. coated with plastic

8. ____ When working near explosive vapors, screwdrivers should be:
   a. made of beryllium copper
   b. made of non-ferrous metals
   c. stored in dry ice prior to use
   d. steel-coated

9. ____ When moving about the job site, tools should be:
   a. tossed
   b. thrown
   c. carried
   d. coated in plastic

10. ____ Wood rasps and files should always be:
   a. used on steel
   b. sharpened
   c. rubber-tipped
   d. clamped the object to be filed

Instructor Post Assessment Answers

1. b
2. b
3. a
4. a
5. a
6. a
7. a
8. a
9. c
10. d